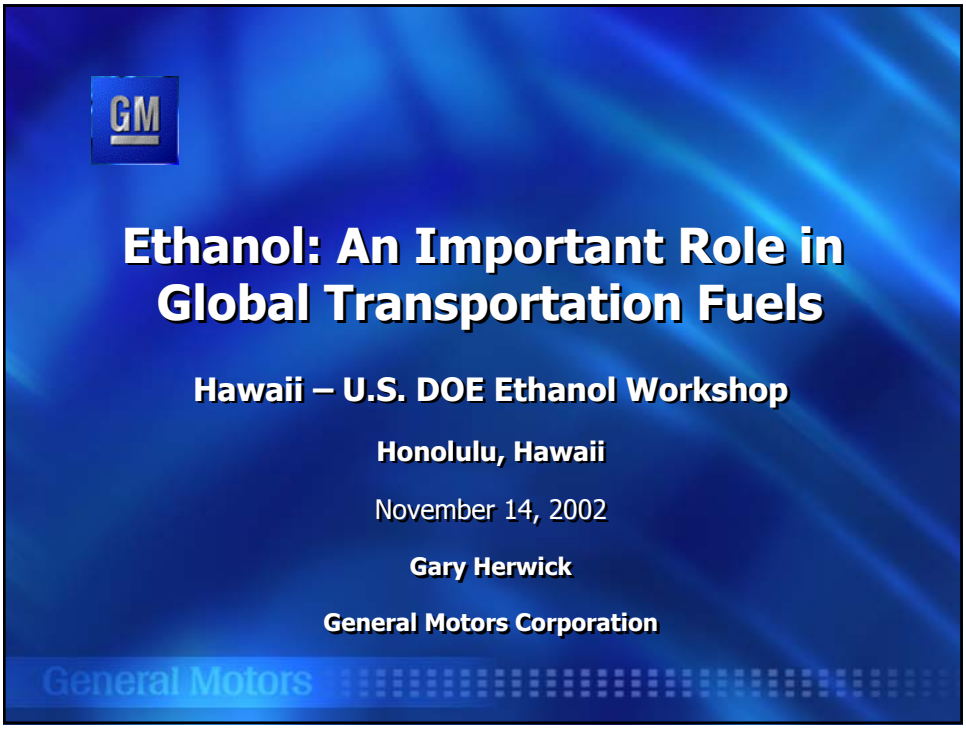
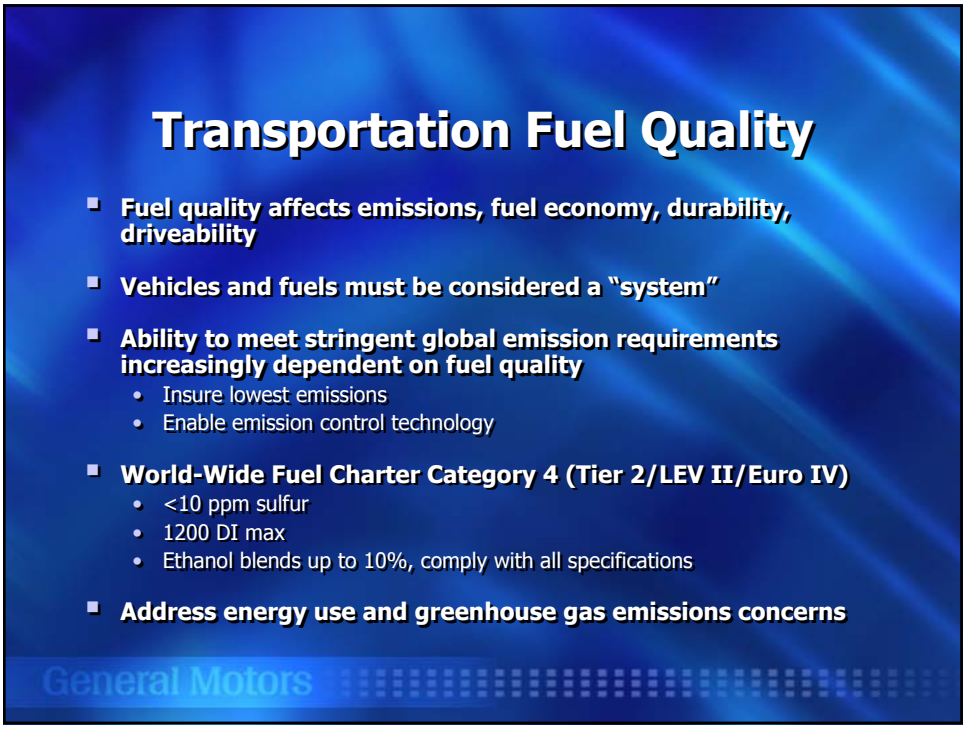
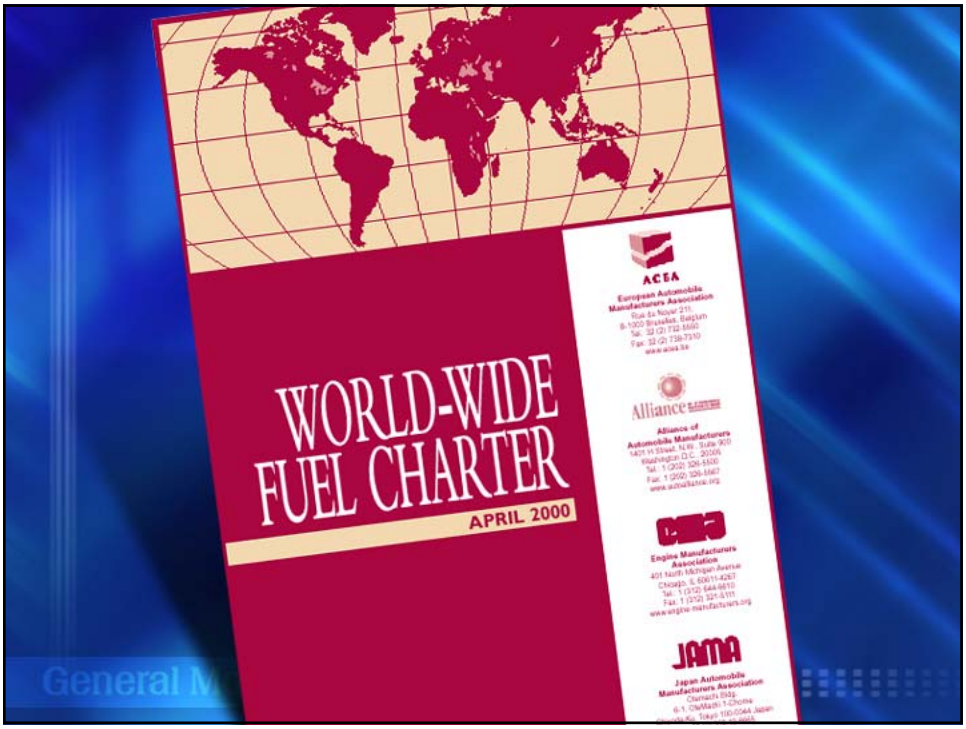

GM
Ethanol: An Important Role in Global Transportation Fuels
Hawaii – U.S. DOE Ethanol Workshop
Honolulu, Hawaii
November 14, 2002
Gary Herwick
General Motors Corporation
General Motors


Transportation Fuel Quality
Fuel quality affects emissions, fuel economy, durability, driveability
Vehicles and fuels must be considered a "system"
Ability to meet stringent global emission requirements increasingly dependent on fuel quality
Insure lowest emissions
Enable emission control technology
World-Wide Fuel Charter Category 4 (Tier 2/LEV II/Euro IV)
<10 ppm sulfur
1200 DI max
Ethanol blends up to 10%, comply with all specifications
Address energy use and greenhouse gas emissions concerns
General Motors



General Motors Promotes the Use of Ethanol in Transportation Fuel

- **Approved the use of 10% ethanol blended gasoline in all GM products for 20 years**
- **Owners manuals *recommend* the use of clean fuels containing oxygenates**
- **Largest producer of E85 Flexible Fuel vehicles**
  - Tahoe, Suburban, Yukon, Yukon XL SUV
  - S10, Sonoma, Silverado, Sierra Pickup
- **Strategic transportation fuels initiative**

GM E85 Vehicles

General Motors

The Benefits of Ethanol

- **Clean burning fuel**
  - Ethanol blends reduce sulfur and aromatic hydrocarbons for improved exhaust emission performance
  - Evaporative emissions are increased, but are less reactive in forming ozone
- **Renewable fuel**
- **Domestically produced**
- **Ethanol made from corn reduces greenhouse gas emissions**
- **Longer-term, ethanol made from cellulose has the potential to virtually eliminate greenhouse gas emissions from automobiles**

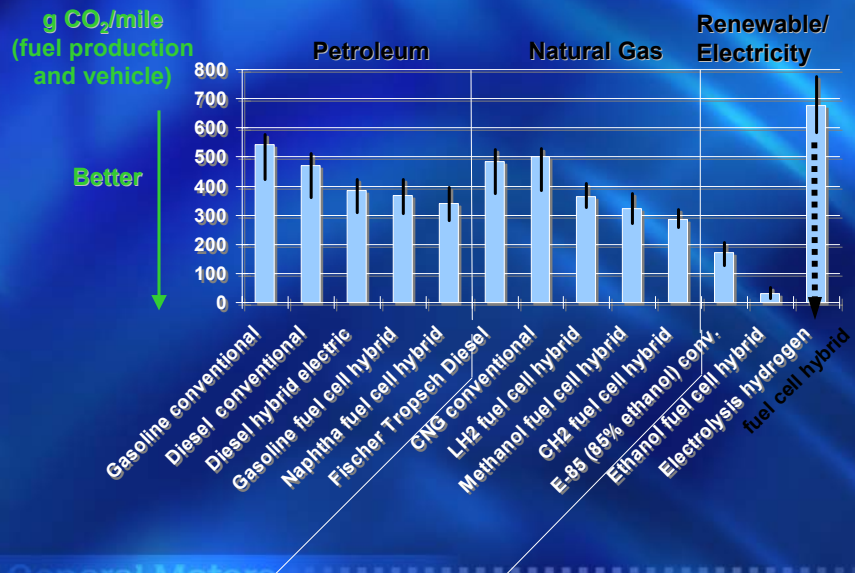
General Motors

Strategic Initiative

- **Promote the use of E85 as a renewable alternative fuel, and as a means of addressing CO2 emission concerns. Support the development of ethanol from cellulose.**
- **GM commissioned Well-to-Wheels life cycle analysis of energy use and greenhouse gas emissions**
  - Compares 15 propulsion technologies and 75 different fuel "pathways"
  - Ethanol (E85) reduces greenhouse gas emissions more than any other alternative fuel
- **"The alternative fuel that makes sense."**

General Motors

Well-to-Wheel Greenhouse Gases



General Motors

Ethanol and Emissions

- **More stringent emission requirements**
  - Zero evaporative emissions
  - Control of warm-up emissions = ability to meet standard
- **Fuel system permeation**
  - Swelling of fuel system elastomer materials
  - Increased evaporative emissions
- **Exhaust emissions**
  - Higher heat of vaporization contributes to incomplete vaporization during engine cold start and warm-up
  - Increased exhaust HC emissions
- **CRC test programs will quantify effects on LEV vehicles**
- **Mitigation strategies are needed**

General Motors

Gasoline DI Limit

- **A DI limit enhances the opportunity for ethanol blended fuels**
- **DI limit applies to the HC blendstock**
- **Mitigates impact of ethanol on cold start HC emissions**
- **Renewable Fuel Standard and a DI limit go together**

General Motors

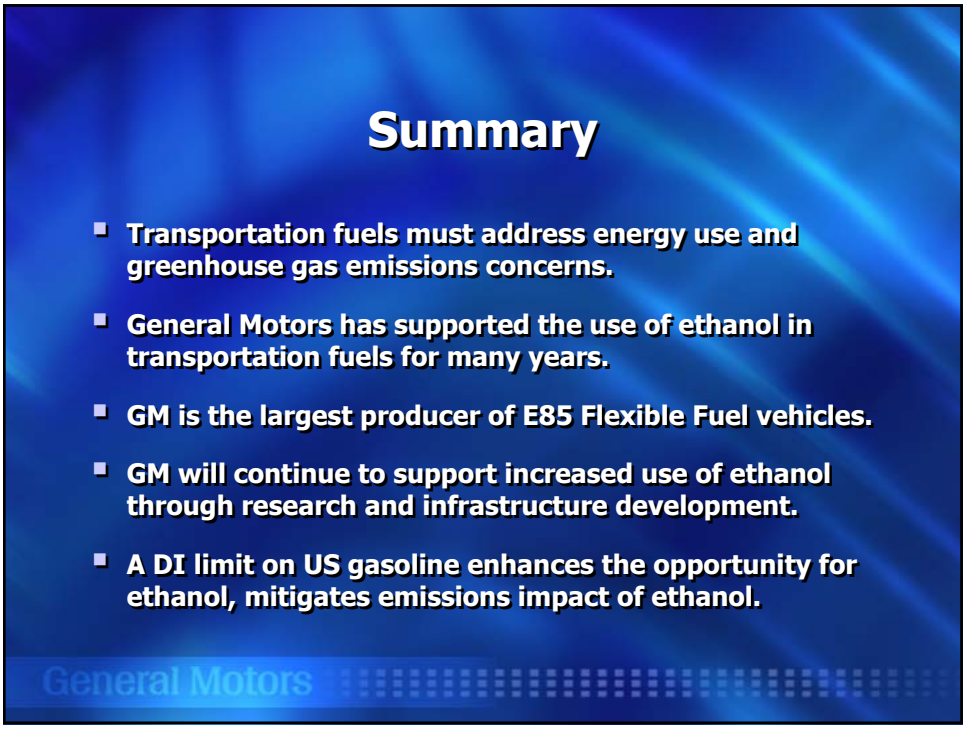
Ongoing GM Support

- **Research on the development of ethanol from bio-mass**
- **Development of E85 fueling infrastructure**
  - Partnership with BP to provide E85 fueling capability for GM company vehicle fleet in Southeast Michigan
  - Additional infrastructure and education project plans
- **Membership in CFDC, NEVC**

General Motors

BP (Amoco) E85 Station
Rochester Hills, MI

General Motors


Summary
Transportation fuels must address energy use and greenhouse gas emissions concerns.
General Motors has supported the use of ethanol in transportation fuels for many years.
GM is the largest producer of E85 Flexible Fuel vehicles.
GM will continue to support increased use of ethanol through research and infrastructure development.
A DI limit on US gasoline enhances the opportunity for ethanol, mitigates emissions impact of ethanol.
General Motors